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the tool for shaping a workpiece

(15) when positioned in the tool;

(d) at least one guide (4) which is in communication with the working space (8) of the tool and which guides a braking plug (6) of the tool.

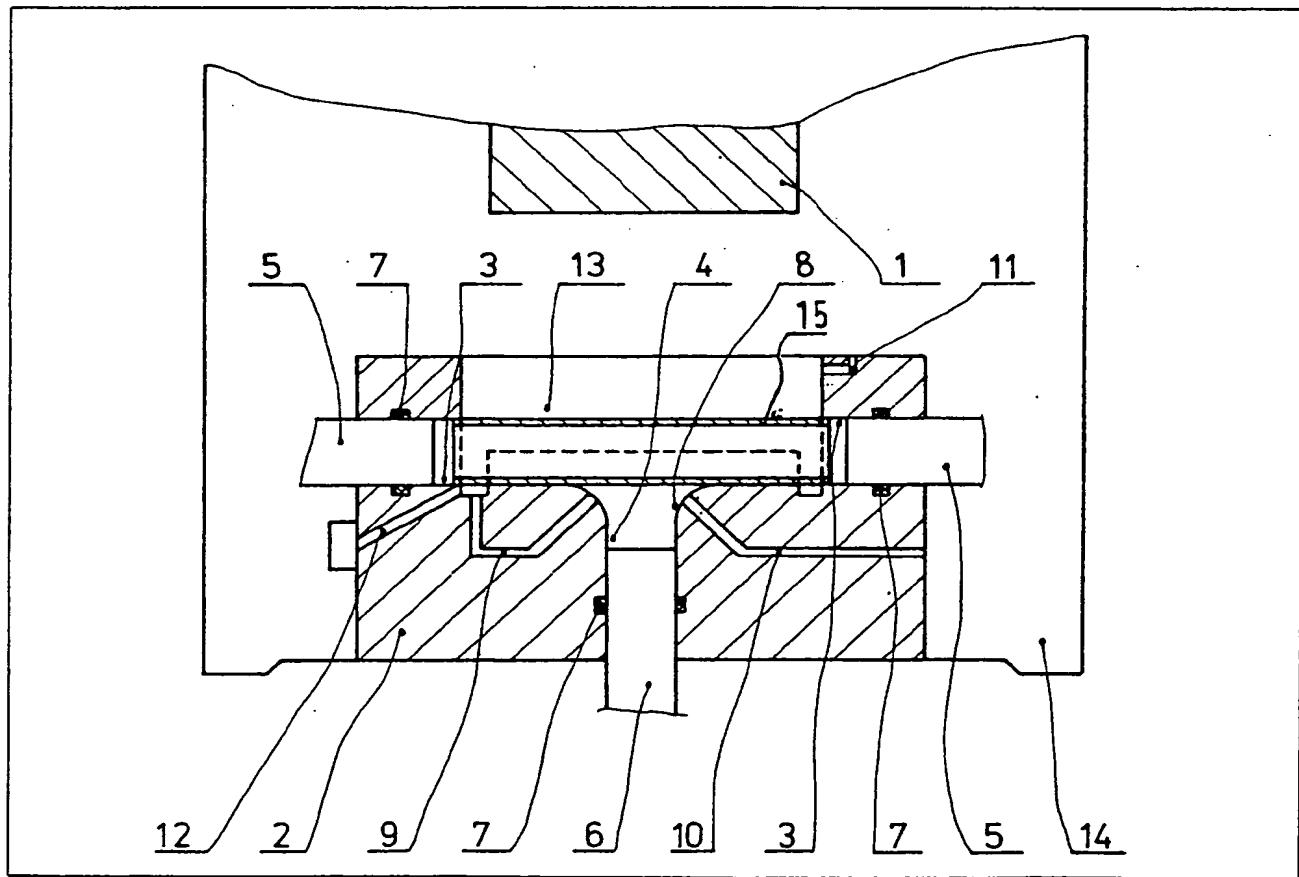
(54) Tool for manufacture of shaped workpieces

(57) The tool comprises an upper part (1) and a lower part (2), the lower part comprising:

(a) a container (13) for a forming medium;

(b) a working space (8) for the shaping of workpieces (15), the space being connected by at least one channel (9) with the container (13);

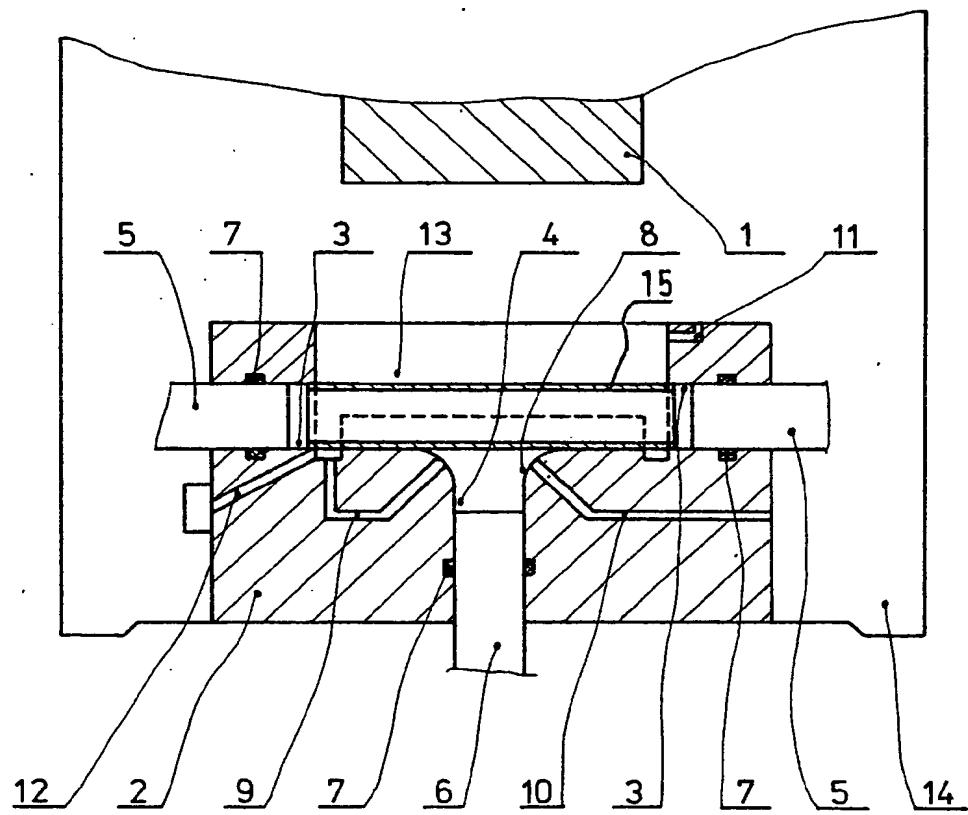
(c) at least two guides (3) which are in communication with the working space (8) of the tool and which guide forming plugs (5) of



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SPECIFICATION

Tool for manufacture of shaped workpieces

- 5 The present invention relates to a tool for the manufacture of shaped workpieces. More particularly, to a tool for the manufacture of shaped workpieces formed in an elastic medium.
- 10 In this technology a blank is subjected to hydraulic pressure by an elastic medium. The treatment causes plastic deformation. The hydraulic fluid is commonly known as a "forming medium".
- 15 Known tools are either placed into tubs filled with the forming medium or they are inserted into a closed operating space of an apparatus designed for this technology. In many cases the working space of the tool
- 20 has to be filled in specific manner, to produce the desired workpiece without, for example, leaving voids in the working space. However, in the regions of the working space where rounded parts of the shaped workpiece are
- 25 formed, deterioration of the surface may still occur. Furthermore, if a forming operation is to be automated, difficulties arise in the removal of the product. There is also no provision, in known tools, for an automatic exchange and clamping of the tool.
- 30 According to the present invention there is provided a tool for shaping workpieces in an elastic forming medium, wherein the tool comprises an upper part and a lower part, the lower part comprising:
- 35 (a) a container for a forming medium;
 - (b) a working space for the shaping of workpieces, the shape being connected by at least one channel with the containers;
- 40 (c) at least two guides which are in communication with the working space of the tool and which guide forming plugs of the tool for shaping a workpiece when positioned in the tool.
- 45 (d) at least one guide which is in communication with the working space of the tool and which guides a braking plug of the tool.
- In order that the invention may be further understood an exemplary embodiment of a
- 50 tool according to the present invention is illustrated in the accompanying figure.
- The tool comprises an upper part 1 and a lower part 2. Cylindrical guides 3, 4 are provided in the lower part 2 of the tool for forming plugs 5 and for braking plug 6.
- 55 These plugs 5, 6 are sealed by packings in grooves 7 in the lower part 2. The lower part 2 of the tool comprises: a container 13 filled with a forming medium, for example, oil or an emulsion and the working space 8. A channel 9 connects the container 13 with the working space 8. A discharge channel 10 may also lead from the working space 8, to the space 14 outside of the tool. A supply channel 11
- 60 and an outlet channel 12 for the forming

medium communicates with the container 13.

The forming medium is supplied into the lower part 2 of the tool either in individual doses or continuously. The packings in

- 70 grooves 7 prevent any leakage of the forming medium along the shaping plugs 5 in cylindrical guidings 3 and along the braking plug 6 in the cylindrical guicing 4.

The shaping proceeds as follows:

- 75 The container in the lower part 2 of the tool is filled with the forming medium for example with oil or an emulsion.

A tubular blank 15 is of stiff material such as steel, copper or the like is inserted into the 80 forming space 8 so that it is filled with the forming medium. The forming medium simultaneously lubricates the entire surface of the blank and deaerates its internal space. The upper part 1 of the tool is lowered on the

- 85 lower part 2 and clamps the blank. The forming plugs 5 bear on the lateral faces of the blank and secure the sealing of its internal space.

The working pressure of the forming medium is generated by the advance of the forming plugs 5. The blank is at this time secured between both the forming plugs 5 and the upper 1 and lower 2 tool parts.

- 90 The forming force generated by the advance 95 of forming plugs 5 causes plastic deformation of the material in the forming space 8. The required braking force is generated in braking plug 6.

The end of the forming process is achieved 100 when the braking plugs 5 come into a required position.

The lifting of the workpiece for its removal from the forming space is achieved by means of braking plugs 6, after decompression of the 105 forming medium and raising of the upper part 1 of the tool.

In the course of the shaping process when the upper part 1 of the tool is in operation any excess forming medium is removed from

110 the space where rounded parts of the workpiece are formed either via the channel 9 of the container or via the discharge channel 10. The size of the channel 9 of the container or the size of the discharge channel 10 respectively are determined by the size of the tool,

115 the size and subdivision of the workpiece and by the degree of heating of the forming medium in the course of the shaping operation. The outlet channel 12 serves to dis-

120 charge forming medium from the lower part 2 of the tool and also for a possible exchange of the forming medium if this becomes necessary due to the thermal condition of the tool.

The working space of the tool is filled directly. 125 In some arrangements, both the channels 9 of the container and discharge channels 10 are provided, simultaneously.

CLAIMS

- 130 1. A tool for shaping workpieces in an

- elastic forming medium, wherein the tool comprises an upper part and a lower part, the lower part comprising:
- (a) a container for a forming medium;
 - 5 (b) a working space for the shaping of workpieces, the space being connected by at least one channel with the container;
 - (c) at least two guides which are in communication with the working space of the tool
 - 10 and which guide forming plugs of the tool for shaping a workpiece when positioned in the tool;
 - (d) at least one guide which is in communication with the working space of the tool and
 - 15 which guides a braking plug of the tool.
2. A tool as claimed in claim 1 wherein the guides for the forming plugs and the guide or guides for the braking plug or plugs are cylindrical.
- 20 3. A tool as claimed in claim 1 or 2 wherein the guides for forming plugs and the guide or guides, for the braking plug, or plugs, are provided with grooves for packings.
4. A tool as claimed in claim 1, 2, or 3
- 25 5. A tool as claimed in claim 1, 2, 3, or 4 wherein at least one supply channel and at least one outlet channel for the forming medium are provided in the lower part of the tool, the channels communicating with the container for the forming medium.
- 30 6. A tool as hereinbefore described with
- 35 reference to the accompanying figure.

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